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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/019,350	10/19/2001	Michael Franks Robinson	0892161.000000US	1373
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Townsend and Townsend and Crew Two Embarcadero Center 8th Floor San Francisco, CA 94111		EXAMINER RAO, G NAGESH		
		ART UNIT PAPER NUMBER		
		1722		
DATE MAILED: 05/17/2006				

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/019,350

Applicant(s)

ROBINSON, MICHAEL FRANKS

Examiner

G. Nagesh Rao

Art Unit

1722

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 February 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-32 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-32 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-4,6, 8-26, 28, 30-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishizumi et al. (EPO 0683249 A1 and further in view of Oki (JP-58-125698) and McInerney et al. (US 6,143, 082).

Ishizumi et al. discloses a method and apparatus for vapor growth. The method is described in the abstract as capable of growing a compound semiconductor layer having an evenness and an interfacial sharpness in units of atomic layers with a good productivity. Thus Ishizumi suggests a method that is commonly known in the art as an atomic layer epitaxy (ALE) or deposition (ALD). (see col. 1 and 2 Description of Prior art.) An example of the apparatus is shown in Fig. 1. Starting in col. 7, Fig. 1 is described. The chamber (1) has a cylindrical portion (1b) extending in a vertical direction. Portion (1b) has an upper (1a) and lower (1c) portion. (1a) is the end from which reactants are introduced through pipes (2) and (3). One pipe supplies the cation and the other the anion of the

compound semiconductor to be formed. A substrate holder (5) lies in the cylindrical portion (1b) and holds the substrate (4). The example shown in Figs. 2A, 2b, and 2C shows the use of the partition plate (6) as the substrate is rotated from the, in this case, TMG side to the Arsine side. The gases are supplied sequentially to grow the GaAs (a III-V semiconductor) film of the substrate as the raw material gases are decomposed. Figs. 5A-5D show a modification in which hydrogen is used to form the partition of gases (i.e. a gas shield) within the chamber. Other compound semiconductors can be grown such as zinc selenide (see Fig. 7), gallium nitride (see Fig. 8), and gallium indium phosphide (Fig. 9). A useable substrate material is given in col. 12 line 15-20 as the known semiconductor GaAs. The examiner notes that many semiconductors are known in addition to SiC, such as GaAs. Heat is described as supplied to the substrate by the built-in heater in the substrate holder (5). Temperatures are specific to the material to be deposited and examples in col. 13 include 500°C and 800-1000°C for GaN.

Ishizumi et al. does not explicitly disclose separate temperatures for the raw materials added or that different heating mechanisms be used.

Oki et al. discloses a method and an apparatus in which separate gas streams are used to supply raw material compounds to a reactor used in deposition of a compound III-V semiconductor. (see abstract) A line supplying one raw material

(6) has a separate heating element (7) within it. Fig. 3 shows an electrically activated (i.e. a wire) heater. The other raw material is supplied to the reactor separately. A heating RF coil (3) heats the substrate (4) within the chamber.

McInerney et al. discloses a multi-station processing chamber similar to that of Ishizumi et al. and suggests optimization of the process parameters such as temperature in col. 11 lines 5-15.

It would have been obvious to one of ordinary skill in the art at the time of the present invention to combine the Oki , McInerney et al. and Ishizumi et al. disclosures because then the temperatures at which the raw materials were decomposed could be more easily controlled as suggested by Oki et al. (see page 3 of the translation, 1st full para.). and McInerney et al.

In respect to claims, 1-4, 6, 8-10, 15, 31-32 it would have been obvious to one of ordinary skill in the art at the time of the present invention to perform a method of epitaxial growth of a material on a substrate including decomposition of multiple gas precursors in a separate and sequential manner at different temperature using different heating mechanisms because separate heating and gas supply are suggested by the presented references. Oki et al. suggests multiple heating devices in such a method. Also, in respect to the limitations of efficiently decomposing precursors and reduction of time from decomposing to combination

at the region on the surface, obviousness is not deficient even if the prior art has a different reason for doing what the applicant has done. [In re Kronig 190 USPQ 425 (CCPA 1976)]

In respect to claims 11-14, it would have been obvious to one of ordinary skill in the art at the time of the present invention to optimize the temperature of the substrate and the decomposition temperature of the precursor because temperature was known to effect the deposition process and two temperatures were suggested by Oki et al.

In respect to claims 16, 19-26, 28, 30 it would have been obvious to one of ordinary skill in the art at the time of the present invention to produce the apparatus thus described with a wire heater in one supply inlet, a heater to heat the substrate, a means for moving the substrate because Oki suggests such as for controlling the temperatures of the raw material gas streams of such deposition systems. The manner in which the apparatus is actually used is not germane to the question of patentability of that apparatus.

In respect to claim 17, it would have been obvious to one of ordinary skill in the art at the time of the present invention to form the second inlet adjacent to the substrate support because that is where the raw material is directed.

In respect to claim 18, it would have been obvious to one of ordinary skill in the art at the time of the present invention to design a gas inlet including a elongate slot or just a plain hole because the Oki et al. has slots as does Ishizumi et al. where gas is admitted to the chamber and the working of such slots is well within the limits of engineering skill.

In respect to claims 31-32, it would have been obvious to one of ordinary skill in the art at the time of the present invention to optimize the temperatures within the system because the use of optimal temperature is suggested by the references.

3. Claims 5, 7, 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishizumi et al. as applied to the claims above.

Ishizumi et al. combined is described above.

Ishizumi et al. combined does not disclose the deposition of SiC or Group IV semiconductors.

In respect to claims 5, 7, 27, it would have been obvious to one of ordinary skill in the art at the time of the present invention to use the method of Ishizumi et al. to deposit the known compound semiconductor SiC or those composed of Group IV because Ishizumi et al. suggest such use for non-specific compound

semiconductor deposition. (col. 2 lines 45-50) Motivation would be found in that a broad range of compound semiconductors deposited would expand process flexibility.

4. Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ishizumi et al. as applied to the claims above, and further in view of Neda et al. (US 5,656,773).

Neda et al. discloses a device with a heating wire. In column 5 lines 59-64, it was conventional to use Pt heating wires.

It would have been obvious to one of ordinary skill in the art at the time of the present invention to use Pt (a known and common chemical catalyst) as a heating wire because it was successfully used in such a capacity in the past.

In respect to claim 29, it would have been obvious to one of ordinary skill in the art at the time of the present invention to form the heating wire from Pt (a known catalyst) because such material was used by Neda as a wire heater and because of the commonly known property of Pt as a non-reactive noble metal.

Response to Arguments

5. Applicant's arguments filed 2/23/2006 have been fully considered but they are not persuasive.

The argument that the heating of the first and second precursors to their respective different decomposition temperatures was new and unobvious was not convincing. Additionally, the different reasons of the prior art for doing what the applicant has done does not indicate a deficient obvious rejection under USC 35 103(a). Oki et al. discloses two heating means in such a process and apparatus and McInerney et al. suggests temperature optimization in each step of a multi-station method and process.

Examiner would like to point out although Professor Watkin's affidavit addressed the differences between the prior art and the current patent application submitted by the applicants, there was no clear differentiation between the references and what was explicitly claimed by applicant. It was unclear how the prior art had no motivation combine given their relationship to one another in deposition layering techniques. Examiner respectfully submits that what Professor Watkin has stated would be true, however the affidavit fails to address the specific claims in whole as to how the claimed invention differs from the prior art put forth.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to G. Nagesh Rao whose telephone number is (571) 272-2946. The examiner can normally be reached on 9AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Yogendra Gupta can be reached on (571)272-1316. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

GNR



ROBERT KUNEMUND
PRIMARY EXAMINER